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ABSTRACT

This paper reports the results of an analysis performed using data from the mathematics component of the 1986 National Assessment of Education Progress (NAEP) for grades 7 and 11. The purpose of the analysis was to study the relationship between mathematics achievement and students' attitude related to learning mathematics for the two grades. The five content areas selected for this study were fundamental methods, data organization and interpretation, measurement, knowledge skills and high-level applications of numbers and operations. The background and the methodology of the analysis are described, followed by results in both tabular and written form, and technical notes. (KR)

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National Assessment of
Educational Progress, 1985–86

NAEP Mathematics Subscales and Math-Learning Attitude Factors

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Ching C. Yu
Education Assessment Division

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Background

In 1986, the National Assessment of Educational Progress (NAEP) assessed grades 3, 7, and 11 in reading, science and mathematics. NAEP is a project of the National Center for Education Statistics conducted by Educational Testing Service (ETS). In addition to achievement data, the 1986 NAEP assessment collected student background data, including student experience with mathematics. This ED TAB reports the results of an analysis performed using data from the mathematics component of the 1986 assessment for grades 7 and 11. Because different types of questions were used in the collection of most background data for grade 3, this tabulation does not include the analysis for grade 3. The purpose of the analysis was to study the relationship between mathematics achievement and students' attitude related to learning mathematics for the two grades. The primary audience for this publication is educational researchers, educational policy makers, and mathematics teachers.

NAEP identified seven content areas of mathematics and developed their subscales for the 1986 assessment; however, in this analysis, the subscales for the following five content areas were selected for study:

- Fundamental methods,
- Data organization and interpretation,
- Measurement,
- Numbers and operations: knowledge skills, and
- Numbers and operations: high-level applications.

The variables related to students' attitude toward learning mathematics selected for this study include:

- I am good at mathematics,
- I would like to take more mathematics,
- I am willing to work hard to do well in mathematics,
- I enjoy mathematics, and
- I feel good when I solve a math problem alone.

Data on these five subscales and five variables were used in the analysis reported here.

A brief description of the NAEP methodology for the 1986 mathematics assessment and the procedures of this special analysis, entitled Methodology and Technical Notes, is given in two sections at the end of this report. Detailed information on the design of the 1986 assessment, the definitions of background variables, missing data and other technical features are given in "National Assessment of Educational Progress 1985-86 Public-Use

Data Tapes Users' Guide, Version 2.0," by Rogers, A., et al., Educational Testing Service.

The tabulations included in this report provide information about the relationship between math achievement and students' attitude variables. Listed below are a few relationships that have been extracted from the tabulation:

- In grade 7, the students who felt that they were good at mathematics had higher performance than those who did not on three subscales, i. e., (1) measurement, (2) number and operations: knowledge and skills, and (3) number and operations: high-level applications. However, in grade 11, the differences were significant for all of the five mathematics subscales.

- There was a significant difference in performance on the subscale of numbers and operations: high-level applications, in grade 7, between those students who strongly agreed that they should take more math and those who strongly disagreed. In grade 11, the differences between these two groups were significant on all subscales except on the organization and interpretation subscale.

- For both grade 7 and 11, there was no significant difference in performance on any of the five math subscales between the students who strongly agreed that they were willing to work hard to do well in math and those who did not except in the fundamental methods subscale for grade 7. For those students who strongly agreed with the statement, white students performed significantly higher than black students on most of the subscales for both grades.

  The desire to work harder in order to do well in math may be an important intervening variable related to math performance. When comparisons of students' responses were made based upon race/ethnicity, gender of examinee, and type of school examinee attends, it was found that:

  - White students still tended to perform significantly higher than black students and Hispanic students on all five math subscales in both grades 7 and 11.

  - No consistent pattern of gender differences was found on any of the five mathematics subscales for grade 7; however, male students achieved significantly higher than female students on the measurement subscale for grade 11.

  - Private school students performed significantly higher than public school students on the fundamental methods and the measurement subscales in grade 7. However, there were no significant differences in performance on any of

the five subscales between 11th-grade students in these two types of schools.

- In grade 7, the students who strongly agreed with the statement, "I enjoy mathematics", had higher performance on the subscales of fundamental methods, measurement, and number and operations: knowledge skills than those who did not. However, the performance difference between those two groups of the students for grade 11 was only observed in the measurement subscale. Also in grade 11, white students who agreed with the statement had higher performances than black students in all of the subscales.

- Most students agreed with the statement, "I feel good when I solve a math problem alone." For both grades 7 and 11, there were no significant differences in performance on any of the five math subscales between those who "feel good when solve a math problem alone" and those who do not. For those students who agreed or strongly agreed, white students had significantly higher performance on most of subscales than black students in both grades 7 and 11.

Methodology

Mathematics items administered in the 1986 assessment were grouped into seven content areas by NAEP. However, in this analysis, five subscales were selected for study because they were administered to students in both grades 7 and 11. They provide a measure of how students at a particular grade level performed in a particular content area. Briefly, the subscales included in the tabulations of this report are the following:

- Fundamental Methods -- includes exercises covering the basic tools of mathematics: deductive and inductive proof, logic, problem solving strategies and empirical induction.

- Data Organization and Interpretation -- includes exercises to assess organizing, analyzing and interpreting data including determining measurement of central tendency and of spread.

- Measurement -- includes exercises to assess the development of concepts of measurement, equivalence and instrument reading (e.g., length, time, temperature, mass/weight, area/volume, angles, scale drawing and money).

- Numbers and Operations: Knowledge and Skills -- includes exercises which measure knowledge of words, symbols and figures and the skills of performing straightforward computations with whole numbers, common fractions, decimals and percents.

- o Numbers and Operations: Higher Level Applications -- includes exercises to measure a deeper understanding of concepts and relationships between and among whole numbers, fractions, decimals and percents. Problem solving processes are stressed, screening relevant from irrelevant information, recognizing patterns and symbolizing relationships.

A detailed description of the content areas covered in the 1985-86 NAEP mathematics assessment can be found in "Math Objectives: 1985-86" (National Assessment of Educational Progress, Princeton, NJ 08541).

The sample for the 1986 assessment was based on a stratified, three-stage sampling design. The sample sizes for the 1986 mathematics component were approximately 3,100 and 2,800 students for grades 7 and 11 respectively.

NAEP uses a complex method of packaging cognitive items (including the five content areas of mathematics) called Balanced Incomplete Block (BIB) spiraling, in which all participating students are not presented with the same items. All the items are divided into blocks, which are assigned to booklets in a BIB design. Different booklets are then assigned to students in a spiraled design. The BIB spiraling is a variant of the matrix sampling method of packaging exercises.

Since 1983, NAEP has used the scale scores produced by item response theory models as the measure of average group performance on cognitive exercises; however, this analysis uses average percent correct or the mean p's. The percent correct is the number of items a student answered correctly on a given subscale divided by the total number of items the student was presented with. The average percents correct were obtained by averaging the percents of items answered correctly by individual students, weighted by their probabilities of selection in the sample.

The tables in this report present the average percent correct figures, indicating the average performance on each of the five subscales for various groups of students, classified by their responses to background/attitude questions or by some NAEP reporting variables used in this analysis. These variables are race/ethnicity, gender, and type of school the student attends.

Tables

1.1 Average percent correct on subscales, by mathematics learning attitude " I am good at mathematics" : Grade 7 7

1.2 Average percent correct on subscales, by mathematics learning attitude " I am good at mathematics" : Grade 11 8

2.1 Average percent correct on subscales, by mathematics learning attitude " I would like to take more mathematics" : Grade 7 9

2.2 Average percent correct on subscales, by mathematics learning attitude " I would like to take more mathematics" : Grade 11 10

3.1 Average percent correct on subscales, by mathematics learning attitude " I am willing to work hard to do well in mathematics" : Grade 7 11

3.2 Average percent correct on subscales, by mathematics learning attitude " I am willing to work hard to do well in mathematics" : Grade 11 12

3.3 Average percent correct on subscales, by mathematics learning attitude " I am willing to work hard to do well in mathematics" totaled by race, gender, and type of school : Grade 7 and 11 13

4.1 Average percent correct on subscales, by mathematics learning attitude " I enjoy mathematics" : Grade 7 14

4.2 Average percent correct on subscales, by mathematics learning attitude " I enjoy mathematics" : Grade 11 ...15

5.1 Average percent correct on subscales, by mathematics learning attitude " I feel good when I solve a math problem alone" : Grade 7 16

5.2 Average percent correct on subscales, by mathematics learning attitude " I feel good when I solve a math problem alone" : Grade 11 17

Table 1.1: Average percent correct on 1985-86 NAEP mathematics subscales by mathematics learning attitude: Grade 7
"I am good at mathematics."

	Fundamental Methods			Data Organization & Interpretation			Measurement			Numbers & Operations: Knowledge/skills			Numbers & operations: Higher level applications			Total across subscales		
	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N
Good at mathematics																		
Strongly disagree	38	7.9	55	41	7.0	53	33	5.4	108	44	5.3	108	28	4.7	108	36	5.9	108
Disagree	41	5.4	125	47	4.6	132	33	3.6	243	47	3.5	243	28	3.2	243	38	3.9	243
Undecided	41	3.7	257	50	3.2	258	40	2.5	496	50	2.5	496	30	2.3	496	41	2.8	496
Agree	50	2.6	503	57	2.3	510	49	1.8	1021	63	1.7	1021	39	1.6	1021	52	1.9	1021
Strongly agree	53	5.3	123	60	4.1	129	54	3.0	294	67	2.8	294	46	2.7	294	57	3.3	294
Not reported	25	7.3	51	27	7.6	38	23	5.0	81	35	5.5	81	18	5.1	81	27	6.1	81
Total w/in subscale	46	1.8	1114	53	1.5	1120	44	1.2	2243	57	1.1	2243	36	1.0	2243	47	1.3	2243
Good at mathematics by race/ethnicity of examinee **																		
Strongly disagree																		
White	40	9.4	40	46	8.6	37	33	6.6	73	45	6.7	73	27	5.9	73	37	7.4	73
Black	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Hispanic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
White	45	7.4	69	50	6.0	71	36	4.8	136	52	4.8	136	28	4.2	136	41	5.4	136
Black	-	-	*	-	-	*	24	7.9	44	34	8.0	44	23	7.8	44	27	8.6	44
Hispanic	-	-	*	48	9.8	31	27	6.9	59	37	6.1	59	28	6.1	59	32	7.5	59
Undecided																		
White	45	5.0	148	53	4.2	146	43	3.4	280	54	3.4	280	34	3.1	280	45	3.7	280
Black	31	7.0	60	43	6.8	59	27	5.0	113	40	5.0	113	25	4.6	113	31	5.5	113
Hispanic	38	8.6	46	40	7.3	50	32	5.9	93	50	5.9	93	21	5.0	93	36	6.4	93
Agree																		
White	53	3.3	317	59	2.8	320	53	2.3	649	68	2.1	649	42	2.0	649	56	2.4	649
Black	39	6.2	89	45	5.6	92	29	4.0	180	43	3.9	180	24	3.5	180	33	4.4	180
Hispanic	40	6.8	75	45	6.2	77	37	4.4	158	50	4.4	158	33	3.9	158	41	4.8	158
Strongly agree																		
White	57	6.5	81	67	5.0	82	61	3.8	187	72	3.4	187	51	3.3	187	62	4.2	187
Black	40	10.8	30	41	7.9	35	30	5.9	76	51	5.9	76	27	5.4	76	37	6.7	76
Hispanic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Good at mathematics by gender of examinee **																		
Strongly disagree																		
Male	37	9.7	36	39	8.4	32	37	7.3	58	45	7.1	58	36	6.8	58	39	8.0	58
Female	-	-	*	-	-	*	27	8.0	50	43	8.0	50	18	6.4	50	33	8.8	50
Disagree																		
Male	37	8.1	56	50	6.6	56	35	6.0	94	42	5.4	94	23	5.4	94	35	6.3	94
Female	45	7.2	69	45	6.3	76	32	4.4	149	50	4.5	149	31	3.9	149	39	5.0	149
Undecided																		
Male	38	5.1	128	48	4.5	121	42	3.5	243	48	3.6	243	33	3.2	243	42	3.9	243
Female	44	5.3	129	51	4.6	137	38	3.5	253	52	3.5	253	28	3.1	253	41	3.9	253
Agree																		
Male	50	3.7	258	57	3.2	256	48	2.5	522	59	2.4	522	39	2.2	522	50	2.7	522
Female	50	3.8	245	56	3.2	254	50	2.6	499	66	2.4	499	39	2.3	499	53	2.8	499
Strongly agree																		
Male	56	6.7	76	70	5.2	74	57	3.9	170	68	3.4	170	47	3.4	170	59	4.2	170
Female	48	8.5	47	46	6.8	55	49	4.8	124	67	4.7	124	44	4.3	124	54	5.4	124
Good at mathematics by type of school examinee attends **																		
Strongly disagree																		
Public	38	8.1	51	42	6.9	52	33	5.5	102	43	5.5	102	27	4.8	102	36	6.1	102
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
Public	41	5.6	115	47	4.7	125	33	3.6	229	46	3.6	229	27	3.2	229	37	4.0	229
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Undecided																		
Public	41	3.9	236	48	3.3	241	40	2.6	471	50	2.6	471	31	2.3	471	42	2.8	471
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Agree																		
Public	51	2.8	451	56	2.4	467	49	1.9	926	62	1.8	926	38	1.7	926	51	2.0	926
Nonpublic	43	8.5	52	59	8.0	43	51	5.9	95	67	5.5	95	46	5.4	95	54	6.4	95
Strongly agree																		
Public	53	5.4	116	61	4.2	121	53	3.2	265	67	2.9	265	47	2.9	265	57	3.5	265
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*

- indicates not applicable.
* indicates N<30.
** Small subcategories were not included, so sample sizes may not match totals. See technical notes for discussion.

SOURCE: U.S. DEPARTMENT OF EDUCATION, NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS - 1985-86 MATHEMATICS ASSESSMENT

Table 1.2: Average percent correct on 1985-86 NAEP mathematics subscales by mathematics learning attitude: g
"I am good at mathematics."

	Fundamental Methods			Data Organization & Interpretation			Measurement			Numbers & Operations: Knowledge/skills			Numbers & operation Higher level applications			Total across subscales		
	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N
Good at mathematics **																		
Strongly disagree	39	6.6	70	54	9.8	39	45	5.1	110	53	6.7	70	45	5.3	110	48	6.0	110
Disagree	43	4.0	172	61	6.1	102	50	3.4	271	60	4.2	172	51	3.5	271	54	3.8	271
Undecided	44	3.9	194	67	5.2	121	52	3.2	326	62	3.9	194	52	3.2	326	55	3.5	326
Agree	56	2.3	484	78	2.9	289	62	1.9	771	73	2.2	484	65	1.9	771	66	2.1	771
Strongly agree	66	3.5	144	84	4.7	83	73	3.2	215	81	3.5	145	75	3.2	215	77	3.4	215
Not reported	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Total w/in subscale	52	1.6	1080	72	2.1	644	58	1.3	1718	68	1.5	1081	60	1.3	1718	62	1.4	1718
Good at mathematics by race/ethnicity of examinee **																		
Strongly disagree																		
White	40	7.7	52	56	11.3	30	45	6.0	83	55	7.9	52	48	6.2	83	50	6.9	83
Black	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Hispanic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
White	45	4.8	118	62	7.2	72	54	4.2	189	64	5.0	118	53	4.2	189	56	4.6	189
Black	31	8.8	32	-	-	*	31	8.1	44	45	10.1	32	37	8.9	44	41	9.5	44
Hispanic	-	-	*	-	-	*	51	10.2	30	-	-	*	50	10.5	30	56	11.3	30
Undecided																		
White	47	4.7	139	70	6.0	88	56	3.9	229	63	4.6	139	56	3.8	229	58	4.1	229
Black	-	-	*	-	-	*	37	7.8	49	-	-	*	37	8.0	49	42	8.9	49
Hispanic	-	-	*	-	-	*	41	10.5	31	-	-	*	41	9.9	31	44	11.1	31
Agree																		
White	60	2.7	351	80	3.2	221	67	2.3	539	76	2.5	351	70	2.3	539	71	2.4	539
Black	34	5.4	76	58	10.3	34	40	4.7	132	52	6.2	76	42	4.8	132	45	5.4	132
Hispanic	46	8.8	36	-	-	*	51	6.7	68	63	8.2	36	55	6.6	68	56	7.3	68
Strongly agree																		
White	71	3.9	113	87	5.0	63	80	3.6	161	84	3.9	114	80	3.6	161	82	3.8	161
Black	-	-	*	-	-	*	38	8.6	35	-	-	*	50	9.2	35	49	9.5	35
Hispanic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Good at mathematics by gender of examinee **																		
Strongly disagree																		
Male	-	-	*	-	-	*	50	9.0	37	-	-	*	50	9.5	37	53	9.9	37
Female	45	8.3	46	-	-	*	42	6.2	73	52	8.0	46	42	6.4	73	46	7.5	73
Disagree																		
Male	41	6.9	57	64	10.5	35	49	5.7	95	55	7.3	57	56	5.8	95	54	6.5	95
Female	44	4.9	115	59	7.5	67	51	4.3	176	63	5.1	115	48	4.4	176	54	4.8	176
Undecided																		
Male	41	5.4	96	68	7.8	58	57	4.5	172	63	5.8	96	52	4.4	172	56	4.8	172
Female	48	5.8	98	67	6.9	63	47	4.7	154	62	5.3	98	52	4.6	154	52	4.9	154
Agree																		
Male	58	3.1	251	77	4.1	150	64	2.7	395	74	3.0	251	65	2.7	395	67	2.9	395
Female	53	3.4	233	80	4.1	139	60	2.7	376	71	3.1	233	65	2.8	376	66	3.0	376
Strongly agree																		
Male	63	4.6	89	84	5.5	57	74	4.1	128	80	4.5	89	76	4.3	128	77	4.4	128
Female	69	5.4	55	-	-	*	73	5.0	87	82	5.6	56	75	4.6	87	76	5.1	87
Good at mathematics by type of school examinee attends **																		
Strongly disagree																		
Public	38	6.7	64	52	10.2	35	45	5.3	101	52	7.0	64	44	5.5	101	48	6.2	101
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
Public	45	4.3	155	60	6.3	95	52	3.7	238	61	4.5	155	49	3.8	238	55	4.1	238
Nonpublic	-	-	*	-	-	*	38	9.4	33	-	-	*	60	9.2	33	49	10.8	33
Undecided																		
Public	44	4.1	178	67	5.4	112	52	3.4	293	62	4.1	178	52	3.3	293	55	3.6	293
Nonpublic	-	-	*	-	-	*	57	10.5	33	-	-	*	51	10.4	33	54	10.9	33
Agree																		
Public	56	2.5	426	78	3.1	258	63	2.0	689	73	2.3	426	65	2.0	689	67	2.2	689
Nonpublic	56	6.4	58	79	9.2	31	56	6.1	82	73	6.0	58	69	5.8	82	65	6.6	82
Strongly agree																		
Public	65	3.6	128	83	5.1	72	72	3.4	190	80	3.7	129	74	3.4	190	75	3.6	190
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*

- indicates not applicable.
* indicates N<30
** Small subcategories were not included, so sample sizes may not match totals. See technical notes for discussion.

SOURCE: U.S. DEPARTMENT OF EDUCATION, NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS - 1985-86 MATHEMATICS ASSESSMENT

Table 2.1: Average percent correct on 1985-86 NAEP mathematics subscales by mathematics learning attitude grade 7
"I would like to take more mathematics."

	Fundamental Methods			Data Organization & Interpretation			Measurement			Numbers & Operations: Knowledge/skills			Numbers & operations: Higher level applications			Total across subscales		
	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N
Like to take more mathematics																		
Strongly disagree	44	5.1	133	45	4.3	160	39	3.3	298	54	3.2	298	28	2.8	298	42	3.7	298
Disagree	45	4.7	162	49	4.1	162	40	3.2	308	55	3.2	308	37	2.9	308	45	3.5	308
Undecided	47	3.5	292	58	3.0	291	44	2.3	588	58	2.2	588	36	2.1	588	48	2.5	588
Agree	46	3.3	319	55	2.8	309	48	2.2	628	59	2.1	628	37	2.0	628	49	2.4	628
Strongly agree	51	4.7	149	55	4.1	153	50	3.0	326	61	2.8	326	42	2.7	326	52	3.2	326
Not reported	27	6.9	59	33	7.0	45	24	4.5	95	35	5.1	95	19	4.6	95	27	5.5	95
Total w/in subscale	46	1.8	1114	53	1.5	1120	44	1.2	2243	57	1.1	2243	36	1.0	2243	47	1.3	2243
Like to take more mathematics by race/ethnicity of examinee **																		
Strongly disagree																		
White	46	6.1	95	49	5.2	103	42	4.1	199	57	4.0	199	29	3.5	199	45	4.5	199
Black	-	-	*	-	-	*	29	9.0	38	48	9.0	38	24	7.6	38	34	10.0	38
Hispanic	-	-	*	33	10.6	31	25	7.4	52	50	7.4	52	34	6.7	52	36	8.6	52
Disagree																		
White	48	6.3	90	53	5.7	82	44	4.4	175	60	4.3	175	40	3.9	175	49	4.8	175
Black	42	9.8	40	40	8.0	44	30	6.3	73	43	6.3	73	27	5.7	73	34	7.1	73
Hispanic	33	10.4	30	39	9.3	32	30	7.5	54	42	6.8	54	32	7.4	54	36	8.0	54
Undecided																		
White	51	4.5	185	60	3.6	194	47	2.8	395	61	2.7	395	37	2.5	395	50	3.1	395
Black	37	7.2	61	51	7.2	58	28	5.5	102	44	5.5	102	28	5.4	102	34	5.9	102
Hispanic	34	8.8	40	48	8.4	34	36	6.2	80	52	5.8	80	30	5.2	80	40	6.6	80
Agree																		
White	48	4.3	191	57	3.6	188	53	3.0	363	65	2.8	363	42	2.7	363	54	3.2	363
Black	32	7.2	61	39	6.5	53	28	4.5	127	38	4.3	127	21	3.8	127	30	4.9	127
Hispanic	42	7.9	54	50	6.5	58	38	5.0	116	48	5.2	116	26	4.3	116	39	5.7	116
Strongly agree																		
White	58	5.9	91	62	5.2	86	57	4.0	190	67	3.6	190	48	3.5	190	59	4.2	190
Black	34	9.3	36	40	7.9	41	32	5.6	86	48	5.3	86	27	5.0	86	37	6.1	86
Hispanic	-	-	*	-	-	*	33	8.7	43	46	8.3	43	28	8.1	43	37	9.3	43
Like to take more mathematics by gender of examinee **																		
Strongly disagree																		
Male	41	6.5	80	45	5.6	90	39	4.6	162	51	4.5	162	29	4.0	162	41	5.0	162
Female	50	8.2	53	45	6.6	70	39	4.8	136	58	4.6	136	27	3.9	136	45	5.4	136
Disagree																		
Male	40	6.7	79	45	5.6	77	41	4.7	151	51	4.4	151	39	4.2	151	44	5.0	151
Female	50	6.7	83	52	5.8	85	39	4.4	157	58	4.5	157	35	4.0	157	45	5.0	157
Undecided																		
Male	47	4.9	154	57	4.2	145	45	3.3	282	56	3.2	282	37	3.1	282	48	3.6	282
Female	47	5.1	138	60	4.3	146	43	3.2	306	60	3.0	306	34	2.7	306	47	3.5	306
Agree																		
Male	46	4.6	168	60	3.8	159	51	3.0	328	57	2.9	328	38	2.7	328	50	3.3	328
Female	45	4.8	151	50	4.1	150	45	3.3	300	61	3.1	300	37	2.9	300	49	3.5	300
Strongly agree																		
Male	54	6.7	67	66	5.8	63	54	4.3	154	64	3.8	154	45	3.5	154	56	4.5	154
Female	48	6.4	82	48	5.6	90	46	4.3	172	58	4.0	172	38	4.0	172	48	4.6	172
Like to take more mathematics by type of school examinee attends **																		
Strongly disagree																		
Public	45	5.2	127	45	4.3	156	38	3.4	286	54	3.3	286	27	2.9	286	42	3.7	286
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
Public	44	4.9	152	47	4.2	152	40	3.4	286	53	3.3	286	35	3.1	286	44	3.7	286
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Undecided																		
Public	48	3.7	263	59	3.1	267	43	2.4	543	58	2.3	543	36	2.1	543	47	2.6	543
Nonpublic	-	-	*	-	-	*	48	8.6	45	61	7.8	45	37	7.9	45	49	9.2	45
Agree																		
Public	47	3.5	283	55	2.8	289	49	2.3	569	59	2.2	569	38	2.1	569	49	2.5	569
Nonpublic	38	10.2	36	-	-	*	45	7.3	59	60	7.0	59	35	6.8	59	46	7.9	59
Strongly agree																		
Public	50	4.8	138	55	4.3	137	49	3.2	297	60	2.9	297	42	2.8	297	51	3.4	297
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*

- indicates not applicable.
* indicates N<30.
** Small subcategories were not included, so sample sizes may not match totals. See technical notes for discussion.

SOURCE: U.S. DEPARTMENT OF EDUCATION, NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS - 1985-86 MATHEMATICS ASSESSMENT

Table 2.2: Average percent correct on 1985-86 NAEP mathematics subscales by mathematics learning attitude: grade 11
"I would like to take more mathematics."

	Fundamental Methods			Data Organization & Interpretation			Measurement			Numbers & Operations: Knowledge/skills			Numbers & operations: Higher level applications			Total across subscales		
	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N
Like to take more mathematics **																		
Strongly disagree	43	4.9	120	61	6.9	76	53	3.9	207	61	4.9	120	50	4.0	207	55	4.4	207
Disagree	51	3.6	197	63	5.3	113	55	3.2	301	64	3.5	197	57	3.2	301	59	3.5	301
Undecided	48	3.2	271	74	4.0	171	55	2.7	422	68	3.2	271	59	2.7	422	60	2.9	422
Agree	54	2.8	328	78	3.7	184	62	2.3	528	70	2.7	328	64	2.3	528	65	2.5	528
Strongly agree	65	3.9	140	79	5.5	82	68	3.3	221	79	4.0	141	69	3.4	221	72	3.6	221
Not reported	-	-	*	-	-	*	46	9.2	39	-	-	*	51	8.5	39	52	9.2	39
Total w/in subscale	52	1.6	1080	72	2.1	644	58	1.3	1718	68	1.5	1081	60	1.3	1718	62	1.4	1718
Like to take more mathematics by race/ethnicity of examinee **																		
Strongly disagree																		
White	47	5.7	91	63	8.1	55	54	4.6	157	63	5.6	91	52	4.7	157	57	5.0	157
Black	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Hispanic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
White	52	4.0	151	63	5.9	91	58	3.8	227	68	4.0	151	59	3.7	227	61	4.0	227
Black	-	-	*	-	-	*	37	8.8	42	-	-	*	43	8.9	42	45	9.8	42
Hispanic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Undecided																		
White	52	3.9	184	79	4.5	121	59	3.3	292	71	3.8	184	63	3.2	292	63	3.4	292
Black	29	6.5	49	-	-	*	38	6.0	76	50	7.8	49	39	6.4	76	44	7.2	76
Hispanic	-	-	*	-	-	*	48	9.5	35	-	-	*	53	9.9	35	56	10.7	35
Agree																		
White	58	3.3	240	79	4.2	145	68	2.8	365	73	3.1	240	69	2.7	365	70	3.0	365
Black	31	7.3	48	-	-	*	35	5.5	92	52	7.9	48	42	5.7	92	42	6.3	92
Hispanic	-	-	*	-	-	*	46	8.3	50	-	-	*	53	7.6	50	52	8.7	50
Strongly agree																		
White	68	4.4	102	85	6.0	57	75	4.0	152	81	4.6	103	75	4.0	152	78	4.2	152
Black	-	-	*	-	-	*	43	9.3	32	-	-	*	47	9.7	32	49	10.2	32
Hispanic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Like to take more mathematics by gender of examinee **																		
Strongly disagree																		
Male	36	7.5	47	-	-	*	56	6.3	83	60	7.9	47	52	6.3	83	57	6.8	83
Female	48	6.4	73	64	9.0	47	52	5.0	124	62	6.3	73	48	5.2	124	54	5.7	124
Disagree																		
Male	54	5.6	77	69	8.1	42	59	5.0	122	65	5.3	77	64	4.9	122	64	5.4	122
Female	49	4.7	120	60	6.9	71	52	4.2	179	64	4.6	120	51	4.3	179	55	4.7	179
Undecided																		
Male	49	4.3	147	72	5.6	97	60	3.6	232	68	4.4	147	58	3.6	232	61	4.0	232
Female	46	4.7	124	78	5.6	74	50	4.1	190	67	4.5	124	60	4.0	190	59	4.3	190
Agree																		
Male	54	3.8	166	80	5.2	94	63	3.3	258	72	3.9	166	65	3.3	258	66	3.6	258
Female	55	4.2	162	77	5.3	90	61	3.2	270	67	3.8	162	63	3.2	270	64	3.5	270
Strongly agree																		
Male	67	5.3	75	80	7.2	46	70	4.5	124	77	5.6	75	70	4.7	124	73	4.9	124
Female	62	5.8	65	78	8.4	36	66	5.0	97	81	5.6	66	69	4.8	97	70	5.2	97
Like to take more mathematics by type of school examinee attends **																		
Strongly disagree																		
Public	41	5.2	106	59	7.2	69	53	4.2	185	62	5.2	106	49	4.2	185	55	4.6	185
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
Public	51	3.8	180	62	5.6	104	55	3.4	272	65	3.7	180	55	3.4	272	58	3.7	272
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Undecided																		
Public	47	3.4	238	74	4.2	151	56	2.9	374	67	3.5	238	58	2.9	374	59	3.1	374
Nonpublic	52	8.4	33	-	-	*	54	8.1	48	71	7.6	33	65	8.0	48	62	8.5	48
Agree																		
Public	54	3.1	288	78	3.9	164	62	2.5	466	69	2.9	288	64	2.5	466	65	2.7	466
Nonpublic	55	7.3	40	-	-	*	56	6.7	62	74	7.5	40	67	6.3	62	63	7.5	62
Strongly agree																		
Public	66	4.0	131	79	5.7	76	69	3.4	201	78	4.1	132	70	3.5	201	72	3.7	201
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*

- indicates not applicable.
* indicates N<30.
** Small subcategories were not included, so sample sizes may not match totals. See technical notes for discussion.

SOURCE: U.S. DEPARTMENT OF EDUCATION, NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS - 1985-86 MATHEMATICS ASSESSMENT

Table 3.1: Average percent correct on 1985-86 NAEP mathematics subscales by mathematics learning attitude: grade 7
"I am willing to work hard to do well in mathematics."

	Fundamental Methods			Data Organization & Interpretation			Measurement			Numbers & Operations: Knowledge/skills			Numbers & operations: Higher level applications			Total across subscales		
	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N
Willing to work hard **																		
Strongly disagree	44	6.2	69	67	6.7	69	34	6.9	69	48	7.4	69	36	7.4	69	43	7.9	69
Disagree	58	5.5	67	58	6.9	67	31	7.1	67	43	7.4	67	33	7.2	67	40	7.8	67
Undecided	67	2.8	244	74	3.4	244	37	3.8	244	55	3.9	244	42	4.0	244	52	4.1	244
Agree	70	1.2	1326	76	1.5	1326	40	1.6	1326	60	1.7	1326	44	1.7	1326	54	1.8	1326
Strongly agree	70	1.4	903	79	1.7	904	43	2.0	903	61	2.0	904	47	2.1	904	57	2.1	904
Not reported	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Total w/in subscale	68	0.8	2637	76	1.0	2638	40	1.2	2637	59	1.2	2638	44	1.2	2638	54	1.3	2638
Willing to work hard by race/ethnicity of examinee **																		
Strongly disagree																		
White	46	8.9	36	72	9.2	36	40	10.0	36	52	10.4	36	40	10.4	36	48	11.1	36
Black	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Hispanic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
White	61	6.9	38	61	9.0	38	31	9.5	38	44	9.9	38	33	9.5	38	42	10.3	38
Black	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Hispanic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Undecided																		
White	70	3.3	161	75	4.1	161	41	4.8	161	58	4.8	161	46	5.0	161	55	5.1	161
Black	53	7.5	36	68	9.7	36	21	8.5	36	39	10.1	36	26	9.6	36	36	10.6	36
Hispanic	59	7.1	39	65	9.1	39	30	8.4	39	51	9.9	39	35	9.7	39	44	10.2	39
Agree																		
White	73	1.5	816	79	1.8	816	43	2.1	816	63	2.1	816	48	2.2	816	58	2.3	816
Black	60	2.8	250	69	3.7	250	26	3.5	250	49	4.1	250	31	3.8	250	43	4.2	250
Hispanic	63	3.1	211	65	4.1	211	29	3.9	211	49	4.4	211	33	4.2	211	44	4.5	211
Strongly agree																		
White	72	1.9	512	82	2.1	512	49	2.7	512	65	2.6	512	52	2.8	512	61	2.8	512
Black	63	2.9	221	70	3.9	222	27	3.7	221	50	4.2	222	34	4.1	222	45	4.4	222
Hispanic	64	3.5	138	72	4.8	138	36	5.0	138	56	5.3	138	40	5.0	138	50	5.5	138
Willing to work hard by gender of examinee **																		
Strongly disagree																		
Male	38	7.2	42	62	8.8	42	33	8.8	42	46	9.3	42	36	9.4	42	42	10.0	42
Female	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
Male	60	6.6	42	59	9.2	42	29	8.7	42	43	9.3	42	30	8.8	42	39	9.9	42
Female	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Undecided																		
Male	68	3.5	127	74	4.5	127	36	5.2	127	55	5.3	127	42	5.5	127	52	5.7	127
Female	66	4.3	117	73	5.2	117	38	5.4	117	55	5.7	117	42	5.8	117	51	6.0	117
Agree																		
Male	68	1.7	666	76	2.0	666	40	2.3	666	59	2.4	666	44	2.4	666	54	2.5	666
Female	72	1.6	660	77	2.1	660	39	2.3	660	60	2.4	660	44	2.4	660	55	2.5	660
Strongly agree																		
Male	68	2.1	425	77	2.5	425	43	2.8	425	60	2.9	425	46	3.0	425	56	3.1	425
Female	71	1.9	478	81	2.3	479	43	2.7	478	62	2.8	479	48	2.9	479	58	2.9	479
Willing to work hard by type of school examinee attends **																		
Strongly disagree																		
Public	45	6.2	66	67	6.9	66	32	7.0	66	47	7.7	66	33	7.6	66	43	8.1	66
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
Public	57	5.6	64	57	7.1	64	31	7.2	64	42	7.6	64	31	7.4	64	39	7.9	64
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Undecided																		
Public	66	2.8	233	73	3.5	233	36	3.8	233	54	4.0	233	42	4.1	233	51	4.2	233
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Agree																		
Public	69	1.3	1205	76	1.5	1205	39	1.7	1205	59	1.8	1205	43	1.8	1205	54	1.9	1205
Nonpublic	77	3.7	121	79	4.6	121	45	5.5	121	66	5.4	121	48	5.8	121	59	5.9	121
Strongly agree																		
Public	69	1.5	835	78	1.8	836	42	2.0	835	61	2.1	836	47	2.2	836	56	2.2	836
Nonpublic	76	5.1	68	83	5.8	68	55	7.5	68	67	7.1	68	55	7.3	68	64	7.5	68

- indicates not applicable.
* indicates N<30.
** Small subcategories were not included, so sample sizes may not match totals. See technical notes for discussion.

SOURCE: U.S. DEPARTMENT OF EDUCATION, NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS - 1985-86 MATHEMATICS ASSESSMENT

Table 3.2: Average percent correct on 1985-86 NAEP mathematics subscales by mathematics learning attitude: grade 11
"I am willing to work hard to do well in mathematics."

	Fundamental Methods			Data Organization & Interpretation			Measurement			Numbers & Operations: Knowledge/skills			Numbers & operations: Higher level applications			Total across subscales		
	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N
Willing to work hard **																		
Strongly disagree	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree	44	6.5	46	65	6.7	36	40	8.2	46	68	7.6	46	55	9.1	46	55	9.4	46
Undecided	40	3.5	192	61	3.4	138	51	3.8	192	74	3.5	192	55	4.4	192	58	4.6	192
Agree	45	1.7	836	66	1.6	607	50	1.8	838	76	1.6	838	60	2.0	838	61	2.1	838
Strongly agree	47	2.1	575	65	1.8	444	56	2.1	575	77	1.9	575	61	2.3	575	64	2.4	575
Not reported	29	9.9	30	-	-	*	22	8.6	30	40	8.3	30	21	8.9	30	29	10.3	30
Total w/in subscale	45	1.2	1701	64	1.1	1272	51	1.2	1703	75	1.1	1703	59	1.4	1703	61	1.5	1703
Willing to work hard by race/ethnicity of examinee **																		
Strongly disagree																		
White	47	6.9	39	70	7.2	30	42	8.7	39	70	8.4	39	58	9.9	39	58	10.2	39
Black	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Hispanic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
White	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Black	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Hispanic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Undecided																		
White	42	3.8	163	63	3.9	114	52	4.1	163	75	3.8	163	56	4.8	163	59	5.0	163
Black	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Hispanic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Agree																		
White	47	1.9	639	68	1.7	477	54	2.1	640	79	1.8	640	63	2.3	640	64	2.4	640
Black	31	4.1	111	59	5.5	69	25	4.2	111	67	4.5	111	37	5.5	111	43	6.0	111
Hispanic	47	5.5	71	50	6.3	51	42	6.3	71	65	5.5	71	52	6.5	71	53	7.4	71
Strongly agree																		
White	53	2.7	359	69	1.9	279	66	2.7	359	84	2.2	359	70	2.9	359	71	3.0	359
Black	29	4.5	131	46	4.7	96	29	4.2	131	55	4.4	131	36	5.0	131	40	5.4	131
Hispanic	39	6.9	60	62	7.5	49	40	7.1	60	67	7.0	60	45	7.9	60	51	8.3	60
Willing to work hard by gender of examinee **																		
Strongly disagree																		
Male	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Female	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
Male	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Female	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Undecided																		
Male	36	4.5	107	60	4.4	76	54	5.4	107	72	4.6	107	56	5.8	107	59	6.1	107
Female	44	5.6	85	61	5.3	62	48	5.4	85	76	5.4	85	54	6.6	85	57	6.9	85
Agree																		
Male	48	2.4	426	67	2.2	313	56	2.5	426	78	2.1	426	63	2.7	426	63	2.9	426
Female	42	2.3	410	64	2.3	294	44	2.5	412	75	2.3	412	56	2.9	412	58	3.1	412
Strongly agree																		
Male	47	2.9	275	70	2.6	201	59	3.0	275	77	2.7	275	65	3.3	275	66	3.5	275
Female	48	3.1	300	60	2.5	243	53	3.0	300	77	2.7	300	58	3.3	300	61	3.5	300
Willing to work hard by type of school examinee attends **																		
Strongly disagree																		
Public	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	42	14.8	20
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
Public	41	7.0	40	63	7.3	31	38	8.9	40	67	8.0	40	55	9.7	40	54	10.1	40
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Undecided																		
Public	39	3.8	169	60	3.7	123	50	4.1	169	72	3.8	169	54	4.7	169	57	4.9	169
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Agree																		
Public	45	1.8	756	65	1.7	553	50	1.9	758	76	1.6	758	59	2.1	758	60	2.2	758
Nonpublic	48	4.7	80	74	5.1	54	54	5.7	80	81	4.8	80	69	6.1	80	68	6.6	80
Strongly agree																		
Public	46	2.2	518	64	1.8	400	54	2.2	518	75	2.0	518	60	2.4	518	62	2.6	518
Nonpublic	59	6.7	57	72	6.4	44	69	6.9	57	90	4.7	57	74	7.0	57	75	7.3	57

- indicates not applicable.
* indicates N<30.
** Small subcategories were not included, so sample sizes may not match totals. See technical notes for discussion.

SOURCE: U.S. DEPARTMENT OF EDUCATION, NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS - 1985-86 MATHEMATICS ASSESSMENT

Table 3.3: Average percent correct on 1985-86 NAEP mathematics subscales totaled by race, gender, and type of school
" I am willing to work hard to do well in mathematics."

	Fundamental Methods			Data Organization & Interpretation			Measurement			Numbers & Operations: Knowledge/skills			Numbers & operations: Higher level applications			Total across subscales		
	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N
Grade 7																		
Race/Ethnicity of examinee																		
White	71	1.1	1572	79	1.3	1572	44	1.5	1572	62	1.5	1572	48	1.6	1572	58	1.6	1572
Black	60	1.9	536	68	2.5	537	26	2.4	536	48	2.7	537	31	2.6	537	43	2.8	537
Hispanic	61	2.1	430	66	2.8	430	31	2.7	430	51	3.0	430	35	2.9	430	45	3.1	430
Other	70	4.6	99	75	5.2	99	39	5.7	99	59	5.8	99	43	6.1	99	53	6.3	99
Gender of examinee																		
Male	67	1.2	1319	75	1.4	1319	40	1.6	1319	58	1.7	1319	44	1.7	1319	53	1.8	1319
Female	70	1.2	1318	77	1.4	1319	40	1.6	1318	60	1.7	1319	45	1.7	1319	55	1.8	1319
Type of school examinee attends																		
Public	67	0.9	2430	75	1.1	2431	39	1.2	2430	58	1.2	2431	43	1.3	2431	53	1.3	2431
Nonpublic	75	2.9	207	79	3.5	207	48	4.2	207	66	4.1	207	51	4.3	207	60	4.4	207
Total w/in subscale	68	0.8	2637	76	1.0	2638	40	1.2	2637	59	1.2	2638	44	1.2	2638	54	1.3	2638
Grade 11																		
Race/Ethnicity of examinee																		
White	55	1.8	784	75	2.4	480	63	1.6	1218	72	1.8	785	64	1.5	1218	66	1.7	1218
Black	33	3.8	165	55	6.7	83	38	3.2	278	52	4.2	165	41	3.4	278	44	3.7	278
Hispanic	45	5.6	87	66	7.9	53	48	4.5	154	60	5.4	87	50	4.4	154	52	4.9	154
Other	56	8.4	44	-	-	*	59	5.9	68	68	7.6	44	64	6.2	68	63	6.8	68
Gender of examinee																		
Male	53	2.2	527	74	2.9	319	61	1.9	842	69	2.2	527	62	1.9	842	64	2.0	842
Female	51	2.2	553	71	3.0	325	55	1.8	876	67	2.1	554	58	1.8	876	60	2.0	876
Type of school examinee attends																		
Public	52	1.7	967	72	2.2	582	59	1.4	1535	68	1.6	968	60	1.4	1535	62	1.5	1535
Nonpublic	54	4.6	113	77	6.7	62	54	4.1	183	70	4.4	113	65	4.0	183	62	4.4	183
Total w/in subscale	52	1.6	1080	72	2.1	644	58	1.3	1718	68	1.5	1081	60	1.3	1718	62	1.4	1718

- indicates not applicable.
* indicates N<30.
SOURCE: NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS - 1985-86 MATHEMATICS ASSESSMENT

Table 4.1: Average percent correct on 1985-86 NAEP mathematics subscales by mathematics learning attitude: grade 7 "I enjoy mathematics."

	Fundamental Methods			Data Organization & Interpretation			Measurement			Numbers & Operations: Knowledge/skills			Numbers & operations: Higher level applications			Total across subscales		
	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N
Enjoy mathematics																		
Strongly disagree	64	2.5	314	70	3.1	314	33	3.2	314	53	3.5	314	38	3.4	314	49	3.7	314
Disagree	66	2.4	335	72	3.0	335	35	3.3	335	53	3.4	335	38	3.3	335	49	3.6	335
Undecided	70	1.9	468	77	2.4	468	41	2.8	468	60	2.8	468	46	2.9	468	55	3.0	468
Agree	68	1.4	1030	78	1.6	1030	42	1.9	1029	60	1.9	1030	46	1.9	1030	56	2.0	1030
Strongly agree	73	2.1	448	79	2.4	449	45	2.8	449	65	2.8	449	49	2.9	449	59	3.0	449
Not reported	30	6.1	42	32	6.4	42	22	7.6	42	27	7.5	42	22	7.7	42	26	8.0	42
Total w/in subscale	68	0.8	2637	76	1.0	2638	40	1.2	2637	59	1.2	2638	44	1.2	2638	54	1.3	2638
Enjoy mathematics by race/ethnicity of examinee **																		
Strongly disagree																		
White	66	3.1	213	73	3.7	213	37	4.1	213	55	4.2	213	42	4.2	213	52	4.5	213
Black	51	5.9	40	64	9.2	40	18	7.1	40	42	9.5	40	22	8.4	40	35	9.9	40
Hispanic	60	6.1	52	59	8.8	52	22	7.1	52	42	8.9	52	29	8.3	52	38	9.0	52
Disagree																		
White	72	3.0	198	76	3.8	198	39	4.4	198	56	4.5	198	42	4.4	198	53	4.7	198
Black	53	5.4	67	62	7.3	67	21	6.4	67	42	7.7	67	25	7.0	67	37	7.9	67
Hispanic	47	5.6	57	61	7.9	57	28	7.4	57	47	8.2	57	30	7.7	57	40	8.4	57
Undecided																		
White	72	2.5	289	80	2.9	289	46	3.6	289	63	3.6	289	50	3.8	289	59	3.8	289
Black	64	4.4	78	67	6.7	78	25	6.3	78	46	7.2	78	30	6.7	78	42	7.4	78
Hispanic	67	4.0	81	65	6.4	81	25	5.7	81	53	7.1	81	35	6.8	81	45	7.3	81
Agree																		
White	71	1.7	587	81	2.0	587	46	2.5	587	64	2.5	587	50	2.6	587	60	2.7	587
Black	61	3.1	221	71	3.9	221	28	3.8	220	50	4.2	221	34	4.1	221	45	4.4	221
Hispanic	62	3.5	180	69	4.3	180	34	4.5	180	51	4.7	180	37	4.6	180	47	4.9	180
Strongly agree																		
White	74	2.7	268	81	3.0	268	49	3.6	268	67	3.6	268	52	3.8	268	62	3.9	268
Black	65	4.1	119	73	5.2	120	30	5.3	120	53	5.8	120	37	5.7	120	47	6.1	120
Hispanic	70	6.0	48	75	7.3	48	41	7.8	48	64	8.6	48	46	8.4	48	56	9.1	48
Enjoy mathematics by gender of examinee **																		
Strongly disagree																		
Male	61	3.3	179	68	4.2	179	31	4.2	179	51	4.6	179	38	4.5	179	47	4.8	179
Female	67	3.8	135	74	4.7	135	37	5.0	135	54	5.3	135	39	5.3	135	50	5.6	135
Disagree																		
Male	64	3.1	172	70	4.3	172	36	4.6	172	51	4.7	172	36	4.5	172	47	4.9	172
Female	69	3.5	163	74	4.2	163	34	4.7	163	55	5.0	163	40	4.8	163	51	5.2	163
Undecided																		
Male	69	2.8	232	76	3.4	232	43	3.9	232	59	4.0	232	46	4.1	232	55	4.2	232
Female	71	2.6	236	77	3.4	236	40	3.9	236	61	4.0	236	45	4.1	236	56	4.3	236
Agree																		
Male	68	2.0	499	77	2.3	499	41	2.7	499	59	2.7	499	45	2.8	499	55	2.9	499
Female	69	1.9	531	78	2.3	531	42	2.6	530	61	2.6	531	47	2.7	531	56	2.8	531
Strongly agree																		
Male	71	3.0	217	78	3.4	217	46	4.0	217	65	4.0	217	49	4.2	217	59	4.3	217
Female	74	2.9	231	80	3.3	232	44	3.9	232	65	3.9	232	49	4.1	232	59	4.2	232
Enjoy mathematics by type of school examinee attends **																		
Strongly disagree																		
Public	61	2.6	293	69	3.3	293	32	3.3	293	51	3.6	293	37	3.5	293	47	3.8	293
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
Public	66	2.5	312	71	3.1	312	34	3.4	312	52	3.6	312	37	3.4	312	48	3.7	312
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Undecided																		
Public	71	2.0	428	77	2.5	428	40	2.9	428	60	3.0	428	45	3.0	428	55	3.1	428
Nonpublic	66	7.3	40	76	8.7	40	48	9.9	40	62	9.8	40	49	10.2	40	57	10.4	40
Agree																		
Public	67	1.4	944	77	1.7	944	41	2.0	943	59	2.0	944	45	2.0	944	55	2.1	944
Nonpublic	77	4.7	86	80	5.3	86	48	6.6	86	68	6.2	86	50	6.7	86	61	6.8	86
Strongly agree																		
Public	72	2.2	413	79	2.5	414	44	2.9	414	64	2.9	414	48	3.1	414	58	3.2	414
Nonpublic	82	6.3	35	83	7.8	35	54	9.9	35	73	9.4	35	60	10.0	35	67	10.2	35

- indicates not applicable.
* indicates N<30
** Small subcategories were not included, so sample sizes may not match totals. See technical notes for discussion.

SOURCE: U.S. DEPARTMENT OF EDUCATION, NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS - 1985-86 MATHEMATICS ASSESSMENT

Table 4.2: Average percent correct on 1985-86 NAEP mathematics subscales by mathematics learning attitude: grade 11
"I enjoy mathematics."

	Fundamental Methods			Data Organization & Interpretation			Measurement			Numbers & Operations: Knowledge/skills			Numbers & operations: Higher level applications			Total across subscales		
	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N
Enjoy mathematics **																		
Strongly disagree	43	3.8	181	58	3.5	138	42	4.0	181	70	3.7	181	54	4.6	181	55	4.8	181
Disagree	46	3.1	248	63	3.1	185	48	3.2	248	74	3.0	248	57	3.7	248	59	3.9	248
Undecided	44	2.7	304	62	2.7	223	52	3.1	304	73	2.7	304	57	3.4	304	59	3.5	304
Agree	46	2.0	641	67	1.8	466	54	2.0	642	78	1.7	642	61	2.2	642	63	2.4	642
Strongly agree	47	2.9	297	68	2.3	233	56	2.9	298	81	2.5	298	64	3.1	298	66	3.4	298
Not reported	29	9.9	30	-	-	*	22	8.5	30	41	8.3	30	21	8.9	30	29	10.2	30
Total w/in subscale	45	1.2	1701	64	1.1	1272	51	1.2	1703	75	1.1	1703	59	1.4	1703	61	1.5	1703
Enjoy mathematics by race/ethnicity of examinee **																		
Strongly disagree																		
White	41	4.1	145	62	4.2	107	42	4.3	145	70	4.2	145	54	5.2	145	55	5.4	145
Black	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Hispanic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
White	49	3.5	181	65	3.5	137	52	3.8	181	78	3.5	181	62	4.3	181	63	4.5	181
Black	34	8.7	40	55	8.2	31	26	7.0	40	52	8.4	40	30	9.0	40	37	9.8	40
Hispanic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Undecided																		
White	46	3.0	237	65	3.1	171	55	3.5	237	75	3.0	237	60	3.8	237	62	4.0	237
Black	31	7.6	41	51	7.0	31	34	7.1	41	57	8.4	41	35	8.6	41	42	9.8	41
Hispanic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Agree																		
White	49	2.3	463	70	1.9	348	60	2.4	463	82	2.0	463	66	2.6	463	67	2.8	463
Black	25	4.2	106	47	5.9	64	28	4.5	106	64	4.5	106	37	5.6	106	42	6.1	106
Hispanic	47	6.7	57	61	7.9	42	44	7.6	57	67	6.7	57	49	7.5	57	53	8.1	57
Strongly agree																		
White	51	3.7	192	69	2.4	153	66	3.7	193	86	3.0	193	72	3.9	193	72	4.1	193
Black	27	6.5	58	55	7.2	41	25	6.5	58	64	6.4	58	36	7.2	58	41	8.1	58
Hispanic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Enjoy mathematics by gender of examinee **																		
Strongly disagree																		
Male	49	5.3	81	61	5.1	57	45	6.0	81	69	5.4	81	55	6.7	81	57	7.0	81
Female	37	5.4	100	55	4.9	81	39	5.3	100	71	5.2	100	53	6.4	100	54	6.6	100
Disagree																		
Male	53	4.6	110	68	4.6	87	55	5.0	110	76	4.2	110	63	5.4	110	65	5.7	110
Female	40	4.1	138	59	4.1	98	41	4.1	138	71	4.4	138	52	5.1	138	53	5.4	138
Undecided																		
Male	43	3.5	179	63	3.4	133	54	4.0	179	72	3.5	179	57	4.4	179	59	4.6	179
Female	46	4.2	125	60	4.6	90	48	4.8	125	75	4.1	125	57	5.3	125	59	5.6	125
Agree																		
Male	45	2.7	327	68	2.6	228	58	2.7	327	78	2.4	327	65	3.0	327	65	3.3	327
Female	46	2.8	314	66	2.5	238	50	3.0	315	78	2.6	315	57	3.3	315	61	3.4	315
Strongly agree																		
Male	45	4.0	152	72	3.2	119	59	4.2	152	82	3.6	152	67	4.3	152	68	4.6	152
Female	50	4.2	145	62	3.2	114	53	4.0	146	79	3.5	146	62	4.6	146	63	4.9	146
Enjoy mathematics by type of school examinee attends **																		
Strongly disagree																		
Public	42	4.1	161	57	3.7	127	41	4.2	161	69	4.0	161	52	4.9	161	54	5.1	161
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
Public	46	3.2	223	64	3.2	165	46	3.4	223	73	3.2	223	56	3.9	223	58	4.1	223
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Undecided																		
Public	41	2.9	271	62	2.8	200	50	3.2	271	71	2.9	271	55	3.6	271	57	3.8	271
Nonpublic	59	7.2	33	-	-	*	67	9.2	33	86	7.4	33	66	10.3	33	71	10.3	33
Agree																		
Public	45	2.1	582	65	1.9	426	54	2.1	583	77	1.9	583	60	2.3	583	62	2.5	583
Nonpublic	50	6.1	59	80	5.7	40	61	6.8	59	85	4.9	59	72	6.7	59	72	7.3	59
Strongly agree																		
Public	46	3.1	266	67	2.5	207	55	3.1	267	79	2.7	267	62	3.4	267	64	3.6	267
Nonpublic	55	9.3	31	-	-	*	64	9.3	31	92	6.4	31	78	9.0	31	75	10.0	31

- indicates not applicable.
* indicates N<30.
** Small subcategories were not included, so sample sizes may not match totals. See technical notes for discussion.

SOURCE: U.S. DEPARTMENT OF EDUCATION, NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS - 1985-86 MATHEMATICS ASSESSMENT

Table 5.1: Average percent correct on 1985-86 NAEP mathematics subscales by mathematics learning attitude: grade 7
"I feel good when I solve a math problem alone."

	Fundamental Methods			Data Organization & Interpretation			Measurement			Numbers & Operations: Knowledge/skills			Numbers & operations: Higher level applications			Total across subscales		
	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N
Feel good when solve a math problem alone **																		
Strongly disagree	31	9.6	34	-	-	*	35	9.5	34	40	9.4	34	32	9.8	34	35	10.1	34
Disagree	35	5.7	104	53	8.1	42	36	5.2	104	49	5.3	104	37	5.7	104	40	5.9	104
Undecided	32	3.8	246	62	4.8	119	42	3.7	246	51	3.6	246	39	3.9	246	42	4.1	246
Agree	32	1.8	1150	64	2.4	475	43	1.7	1150	56	1.7	1150	37	1.8	1150	42	1.9	1150
Strongly agree	31	1.8	1039	63	2.5	451	42	1.8	1039	54	1.8	1039	36	1.9	1039	41	2.0	1039
Not reported	20	8.1	40	-	-	*	27	7.8	40	24	7.9	40	19	7.8	40	23	8.3	40
Total w/in subscale	32	1.2	2613	63	1.6	1125	42	1.1	2613	54	1.1	2613	36	1.2	2613	41	1.2	2613
Feel good when solve a math problem alone by race/ethnicity of examinee **																		
Strongly disagree																		
White	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Black	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Hispanic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
White	37	7.0	69	-	-	*	39	6.3	69	54	6.5	69	39	6.9	69	43	7.3	69
Black	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Hispanic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Undecided																		
White	34	4.7	169	66	5.8	82	45	4.6	169	53	4.4	169	41	4.8	169	44	4.9	169
Black	23	10.1	30	-	-	*	31	9.8	30	40	10.8	30	26	10.3	30	31	11.1	30
Hispanic	27	8.8	41	-	-	*	29	8.9	41	45	8.7	41	34	9.4	41	35	9.7	41
Agree																		
White	34	2.3	696	68	3.2	274	47	2.2	696	60	2.1	696	41	2.4	696	46	2.5	696
Black	24	3.9	206	57	6.0	85	29	3.8	206	43	4.2	206	23	3.8	206	30	4.2	206
Hispanic	26	4.0	203	50	5.6	91	33	4.0	203	46	4.1	203	29	4.0	203	34	4.3	203
Strongly agree																		
White	33	2.5	603	66	3.2	272	47	2.4	603	58	2.4	603	39	2.5	603	45	2.6	603
Black	24	3.6	233	52	5.4	99	30	3.7	233	42	3.9	233	24	3.6	233	30	4.0	233
Hispanic	27	4.5	159	57	7.4	61	32	4.3	159	40	4.6	159	30	4.6	159	33	4.9	159
Feel good when solve a math problem alone by gender of examinee **																		
Strongly disagree																		
Male	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Female	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
Male	33	7.0	63	-	-	*	35	6.8	63	47	6.8	63	35	7.1	63	38	7.5	63
Female	38	9.7	41	-	-	*	38	8.0	41	51	8.4	41	41	9.4	41	42	9.6	41
Undecided																		
Male	33	4.8	156	64	6.3	68	42	4.7	156	51	4.6	156	40	4.9	156	43	5.1	156
Female	30	6.2	90	60	7.5	51	42	6.1	90	51	5.8	90	35	6.4	90	40	6.7	90
Agree																		
Male	32	2.4	589	61	3.5	229	41	2.4	589	54	2.4	589	38	2.5	589	42	2.6	589
Female	33	2.6	561	67	3.4	246	45	2.5	561	59	2.4	561	36	2.5	561	43	2.7	561
Strongly agree																		
Male	32	2.7	488	67	3.6	204	44	2.7	488	53	2.6	488	38	2.8	488	42	2.9	488
Female	31	2.5	551	60	3.4	247	41	2.5	551	54	2.5	551	33	2.5	551	40	2.7	551
Feel good when solve a math problem alone by type of school examinee attends **																		
Strongly disagree																		
Public	30	9.7	32	-	-	*	33	9.6	32	37	9.6	32	30	10.0	32	33	10.2	32
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
Public	34	5.8	96	55	8.7	38	36	5.5	96	50	5.6	96	36	5.8	96	40	6.2	96
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Undecided																		
Public	32	3.9	235	61	5.0	114	41	3.8	235	50	3.7	235	38	4.0	235	41	4.1	235
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Agree																		
Public	32	1.8	1058	64	2.6	439	41	1.8	1058	54	1.8	1058	36	1.8	1058	41	2.0	1058
Nonpublic	36	6.6	91	68	7.9	36	55	6.2	91	72	5.8	91	47	6.8	91	53	6.9	91
Strongly agree																		
Public	31	1.9	938	63	2.6	409	41	1.9	938	52	1.9	938	35	2.0	938	40	2.1	938
Nonpublic	31	5.9	101	67	8.4	42	49	6.0	101	63	5.5	101	40	6.3	101	46	6.5	101

- indicates not applicable.
* indicates N<30.
** Small subcategories were not included, so sample sizes may not match totals. See technical notes for discussion.

SOURCE: U.S. DEPARTMENT OF EDUCATION, NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS - 1985-86 MATHEMATICS ASSESSMENT

Table 5.2: Average percent correct on 1985-86 NAEP mathematics subscales by mathematics learning attitude: grade 11
"I feel good when I solve a math problem alone."

	Fundamental Methods			Data Organization & Interpretation			Measurement			Numbers & Operations: Knowledge/skills			Numbers & operations: Higher level applications			Total across subscales		
	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N	AVG %	SE	N
Feel good when solve a math problem alone **																		
Strongly disagree	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Undecided	60	6.2	94	59	6.2	94	57	6.1	94	73	5.7	76	62	6.0	94	62	6.4	94
Agree	60	2.2	727	60	2.2	727	57	2.1	727	75	2.0	553	65	2.1	727	63	2.3	727
Strongly agree	58	2.1	786	58	2.1	786	56	2.0	786	73	2.0	583	65	2.0	786	61	2.2	786
Not reported	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Total w/in subscale	59	1.5	1657	59	1.4	1657	56	1.4	1657	73	1.4	1250	65	1.4	1657	62	1.5	1657
Feel good when solve a math problem alone by race/ethnicity of examinee **																		
Strongly disagree																		
White	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Black	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Hispanic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
White	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Black	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Hispanic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Undecided																		
White	61	6.7	81	62	6.7	81	60	6.7	81	74	5.9	69	64	6.5	81	64	6.9	81
Black	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Hispanic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Agree																		
White	62	2.5	573	63	2.4	573	60	2.4	573	76	2.3	434	68	2.4	573	65	2.6	573
Black	42	7.3	72	43	7.1	72	32	6.8	72	68	7.0	54	45	6.9	72	43	7.5	72
Hispanic	47	7.7	68	47	7.0	68	39	7.0	68	65	7.0	55	51	7.6	68	48	7.9	68
Strongly agree																		
White	63	2.6	510	61	2.6	510	62	2.5	510	78	2.5	369	71	2.5	510	67	2.7	510
Black	43	4.7	172	47	4.7	172	36	4.5	172	57	4.8	132	45	4.6	172	45	4.9	172
Hispanic	50	7.1	73	52	7.1	73	40	6.6	73	67	7.1	57	57	6.9	73	51	7.5	73
Feel good when solve a math problem alone by gender of examinee **																		
Strongly disagree																		
Male	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Female	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
Male	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Female	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Undecided																		
Male	60	7.7	60	60	7.8	60	56	7.7	60	73	7.0	50	62	7.4	60	62	8.0	60
Female	60	10.7	34	58	10.4	34	61	9.9	34	-	-	*	60	10.0	34	62	10.8	34
Agree																		
Male	61	3.0	387	61	2.9	387	60	2.9	387	73	2.8	292	68	2.8	387	65	3.1	387
Female	59	3.3	340	59	3.2	340	53	3.2	340	77	3.0	261	61	3.2	340	60	3.4	340
Strongly agree																		
Male	59	3.1	360	58	3.1	360	59	2.9	360	72	3.0	263	67	3.0	360	63	3.2	360
Female	58	2.9	426	58	2.9	426	53	2.8	426	74	2.7	320	63	2.8	426	60	3.0	426
Feel good when solve a math problem by type of school examinee attends **																		
Strongly disagree																		
Public	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Disagree																		
Public	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Undecided																		
Public	59	6.5	85	58	6.5	85	57	6.4	85	72	6.1	68	61	6.3	85	61	6.8	85
Nonpublic	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*	-	-	*
Agree																		
Public	60	2.3	657	59	2.3	657	56	2.2	657	74	2.2	498	65	2.2	657	62	2.4	657
Nonpublic	65	7.0	70	68	6.8	70	63	6.5	70	80	6.4	55	69	6.7	70	68	7.1	70
Strongly agree																		
Public	57	2.2	706	57	2.2	706	55	2.2	706	72	2.1	532	64	2.2	706	61	2.3	706
Nonpublic	66	6.3	80	63	6.1	80	64	5.8	80	79	6.2	51	72	5.8	80	68	6.4	80

- indicates not applicable.
* indicates N<30
** Small subcategories were not included, so sample sizes may not match totals. See technical notes for discussion.

SOURCE: U.S. DEPARTMENT OF EDUCATION, NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS - 1985-86 MATHEMATICS ASSESSMENT

Technical Notes

1. The NAEP data were used differently for this tabulation than they were in "The Mathematics Report Card: Are We Measuring Up?" (Dossey, J. et al., Educational Testing Service, June 1988). First, data in this tabulation were analyzed by grade level only, rather than by age and grade level of the student as was done in the "Mathematics Report Card." Second, average percent correct figures were used rather than scale scores provided by item response theory models, and third, standard errors were produced using an approximate adjustment based on design effects rather than by the more exact, but more complex jackknife procedures. These procedures are discussed more fully in Introduction to Variance Estimation (Wolter, K. M. New York: Springer-Verlag 1985).

2. Although the math items were grouped into five content area subscales for both grades 7 and 11, the items for the two grades differed and the subscales were not equated across grades and content areas in this analysis. Therefore, the mean p's presented in the tabulation should be used to compare group performance within a grade and for a particular content area, but not across grades or content areas.

3. In computing the percents correct for individual students, items that were left blank, whether omitted or not reached, were treated as incorrect responses in this analysis. However, not-reached items were excluded from the denominator of the formula used to calculate the item-by-item response percentage presented in the ETS tables of the NAEP data. Since not-reached items were treated as incorrect in this tabulation, the results may be different from the values given in the ETS summary table. The main reason of using percents correct is to prevent the bias associated with IRT scales. More detailed information is given in "Bayes Modal Estimation in Item Response Models" by Robert J. Mislevy in Psychometrika (p.177-95, June 1986).

4. Percent correct values were not included for cells in the tabulation which contained fewer than 30 students (indicated by * in the cells). Consequently, the totals for those three row variables may not add to the overall total presented at top of each table.

5. The estimates presented in this tabulation were calculated using appropriate weights to represent all seventh- or eleventh-grade students enrolled in schools in the U.S. except Alaska and Hawaii in 1986. Some students were excluded from the NAEP sample because of limited English

proficiency or severe handicap. The numbers of excluded students were 1382 for grade 7 and 1965 for grade 11. Estimates for these excluded students were not included in the tabulation.

6. As pointed out in Note 1, standard errors are estimated by simple random sampling adjusted for design effects, in place of the more exact but complex jackknife procedures. The technique we used is simpler than the jackknife procedures but provides reasonably good estimates of standard errors. Sample sizes and standard errors corrected to account for the effects of the sample design are presented, by cell, in this tabulation. The standard errors have been adjusted using the design effects procedures suggested by the Educational Testing Service and discussed in the NAEP Users' Guide. To conduct statistical tests comparing subgroups of interest, or to investigate the quality of a particular estimate, the reader should use the standard errors provided, rather than standard errors calculated using simple random sample procedures.

7. Statistical tests of significance were conducted for cell comparisons, though their results are not shown in this report. Two-tailed z-tests were used to determine whether the differences in the average percent correct between cells were statistically significant at the .05 level. The Bonferroni procedure was used to adjust the level of significance to prevent the build-up of Type 1 error. The alpha level was adjusted separately for each of the five subscales. Adjustment was based on the number of z-tests run on each subscale. The results of these analyses are available from the author upon request.

The 1985-86 National Assessment of Educational Progress Public-Use Data Tapes are currently available and can be ordered from the Educational Testing Service, Rosedale Road, Princeton, NJ 08541, (609) 734-1327.

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